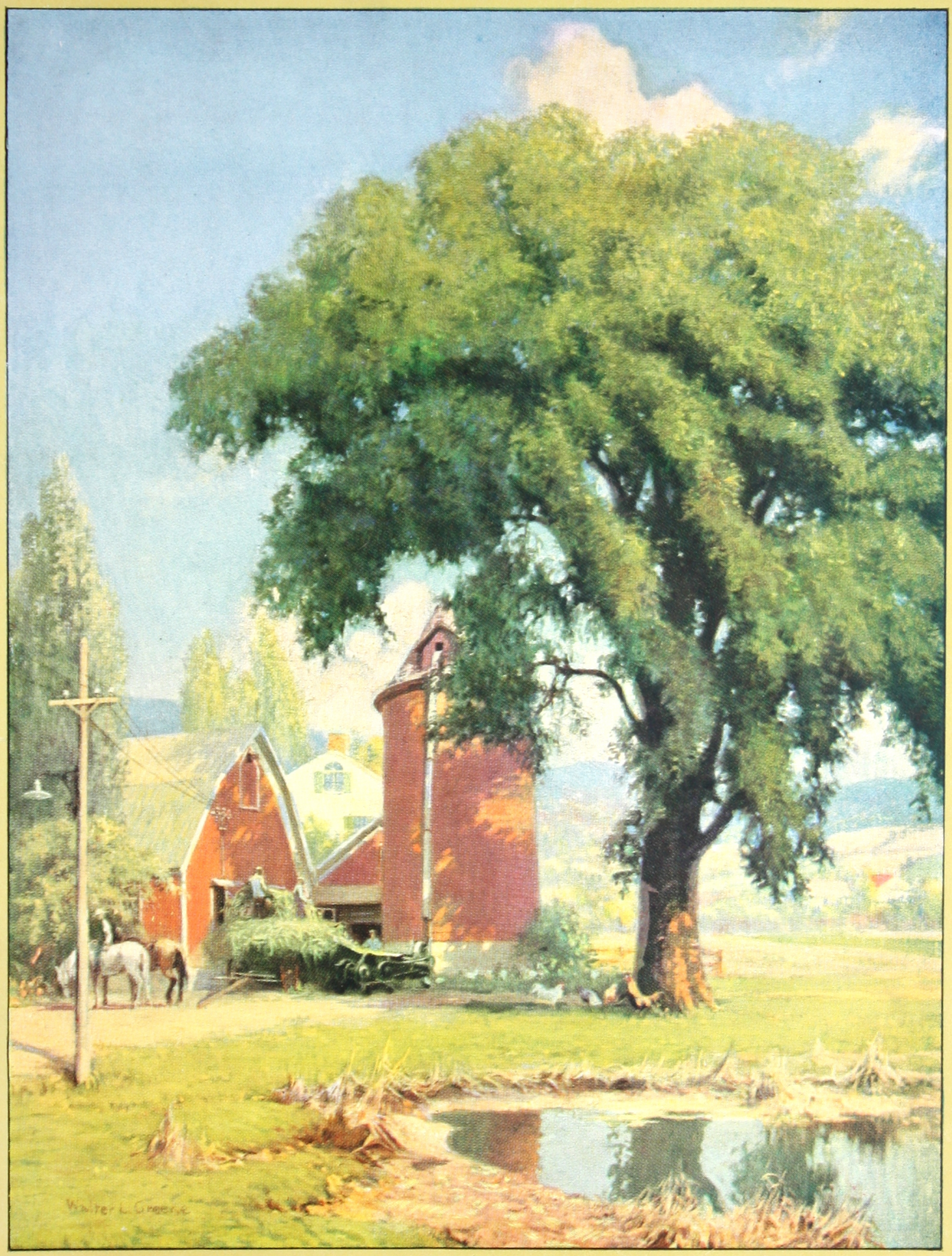


The FARM BOOK

SECOND EDITION

THE farm can be and is being made the best of all places in the world to live. The business of farming must be made to yield profits commensurate with other business. I welcome that Monday morning when the electrically driven milking machine shall have milked the cows; the electrically driven separator shall have produced the cream; the electrically driven churn shall have made the butter. At the same time, in the house the electrically driven washing machine shall be automatically doing its work while breakfast goes on and we shall have sunny, bright, and happy Mondays in place of the old blue ones.

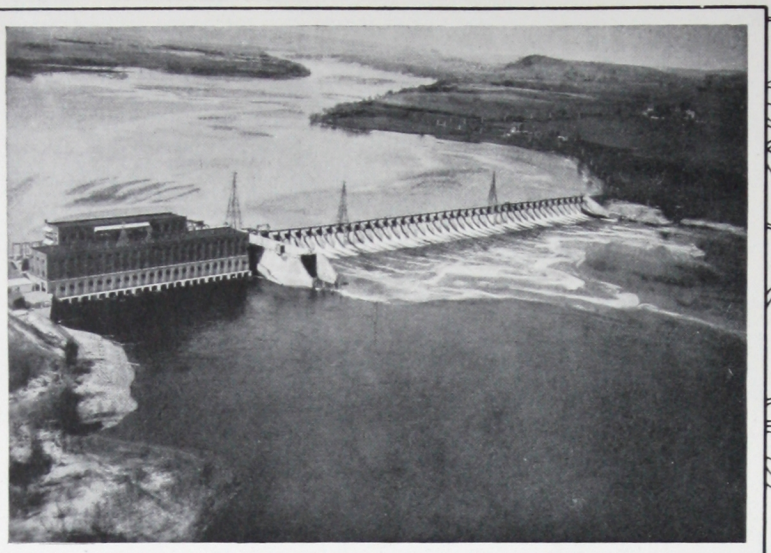
From an address on "Farm Electrification in New York State," by Owen D. Young, Chairman of the Board of Directors, General Electric Company.

The G-E Farm Book

GENERAL ELECTRIC COMPANY

SCHENECTADY, N. Y.

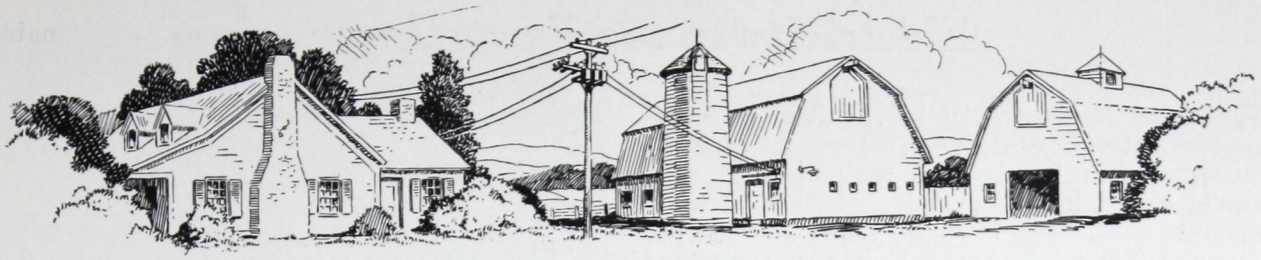
GEA-444
Supersedes GED-10



Great streams constitute one of the important sources of power. Harnessed by dams, the water is made to operate generators that produce electric energy.

This electric energy is transmitted to distant points for use. Here, a line passes through the country, and a local distribution line leads from it.

The current finally reaches the farm, where it is reduced in voltage by the transformer on the pole to a voltage suitable for use in the house and barn.



The GE FARM BOOK

WHAT part can electricity play on the farm and in the farm home?

The question is being asked on thousands of farms and in every section of the country.

This booklet is an attempt to answer it, by word and picture, in a broad way.

In general, it may be said that electricity will lessen the work and increase the comfort of the home.

It will supply light, pump water, run the washing machine, the vacuum cleaner, the refrigerator, the fan, and the sewing machine, heat the electric range, the electric iron, the toaster and the percolator, and operate the great variety of other household devices to which it is now applied.

It will light the barns and other buildings; milk the cows; separate the cream; run the churn; cool the milk; pump water for irrigation, for the stock and for washing cans; chop and grind feed; cut ensilage and elevate it into the silo; operate a threshing machine, fanning mill, potato grader, buzz saw, and work shop machinery and appliances (drills, lathes, soldering iron, saws, etc.); charge radio and motor car batteries, and perform a wide variety of other services of the kind.

In doing these tasks it not only lightens the work immeasurably, but makes it possible to do more in a given time. This is the principle which underlies the progress made by modern manufacturing. The application of power to machinery has made it possible for one operator to increase very greatly the amount of work he turns out.

The mowing machine is a familiar example. By the use of power—horse power—one man can cut a given amount of hay in the same time it would take several men to do it with scythes, and hence at less cost.

The saving of time and work is of increasing importance on the farm because it is becoming much more difficult and much more expensive to hire farm labor than it was a few years ago. Whatever will effect this economy is worth studying as a profitable investment. And, after all, this is by no means the only consideration. Whatever saves time and work makes for better and happier living conditions. Drudgery and monotony need no longer be tolerated. Electricity is a practical means of helping to banish them from the farm.

The range of household appliances and farm machinery which can be operated by electricity is large, and is increasing. However, no one who is considering the use of electric power for these purposes should be dismayed by the thought that a complete equipment need be purchased at one time. It is rather seldom that a house is thoroughly equipped with furniture all at once; a range is bought at one time, a dining room set at another, a chair or a dresser as occasion warrants. The farmer buys his mowing machine, reaper, separator, milking machine, one by one, usually, and not as a group. The same course may well be followed in buying electrical apparatus, except in the case of the wiring system, which should be purchased as a unit.

The application of electric power to the work of any farm and farm home presents some different problems in each case. In solving them, the company which furnishes electric light and power to the section in which the farm is situated will be glad to give advice and counsel, and should be consulted as the first step in the matter.

Electricity in the Farm Home

The value of electricity in the farm home cannot be determined in the same way in which its usefulness in the barn is calculated. It is possible to decide accurately whether it is cheaper to milk cows by hand or by machine. It is more difficult to compute how much can be saved by the use of electric lights and appliances in the home. It is, however, worth a great deal to do away with the drudgery of cleaning and trimming lamps. There is a real value in ridding the farm of the fire danger of oil lamps. It is worth an incalculable sum to lighten the burden of the housewife and preserve her health and strength. Things of this kind are not to be judged from the standpoint of how much they will save in dollars and cents, alone, even though they may actually effect savings. There are values that cannot be rated in terms of money.

Electrical household appliances may be divided into three classes:

(1) *Lamps.*

(2) *Motor-operated devices*, such as pumps, washing machines, vacuum cleaners, fans, sewing machines, dish washing machines, electric refrigerators, etc., as well as dairy machinery—separators, churns, etc.

(3) *Electrically heated devices*—electric ranges, flatirons, ironers, percolators, toasters, water heaters, etc.

A ceiling unit of diffusing glass gives excellent illumination in the kitchen

Lighting the Farm Home

On the basis of convenience, the electric lamp scores heavily in comparison with oil lamps. When electricity is used, there are no lamps to clean and fill, no wicks to trim; there is no necessity of bringing home from town a supply of kerosene. There is no searching for a match to light the lamp; at a touch on a switch, light floods the room.

Nor is there the danger that the inflammable nature of oil offers, or the menace of fire that a carelessly dropped match presents. Electricity is *safe*, Incidentally, also, it is in many cases actually cheaper than kerosene.

In the electrically lighted house, every room is equipped with one or more lamps. As each room is provided with its own lights the danger and inconvenience of carrying oil lamps are forever abolished.

Each house and each room presents, of course, individual problems in lighting, just as it does in respect to wall paper and the color of the woodwork. There are, however, some general principles that apply to all.

It is a first principle of correct lighting that the light should be of sufficient intensity—or sufficiently "strong," to use a common term; it should come from the proper direction, whether one is working, reading, or eating; no glare should strike the eyes.

No room in the farm house needs good lighting more than the kitchen—"the housewife's workshop." Adequate illumination throughout the room is essential. This is best obtained by the use of a lighting fixture containing a 100-watt inside-frosted MAZDA lamp or a unit consisting of a globe or bowl of diffusing glass enclosing a Daylight MAZDA or clear glass lamp. The placing of the unit in the center of the ceiling assures a balanced distribution of light to all parts of the room.

Large kitchens, so common in older houses, may require two lighting units, placed on the longer center line of the ceiling.

The ceiling unit provides general illumination for the room. A lamp on the wall near the range, and another at the sink, will make it possible to work at these places without one's shadow falling on the work. Such lamps should be shaded so that there will be no glaring light from them.

In the dining room, a dome or a shower suspended from the ceiling over the dining table will illuminate the room in general, and particularly the surface of the table. A dome con-

Light is centralized on the dining table by a dome

sists of one large shade of glass or other materials in which one large lamp or several smaller ones may be used; a shower is a group of lamps with individual shades. When a dome is installed, it should be suspended high enough so that those around the table can see one another across the table, but low enough so that the diners cannot see the lamps. This is usually about 56 inches from the floor. Where the number of diners is large, necessitating a correspondingly large table, the shower is the preferable type. Whichever is chosen, inside-frosted MAZDA lamps should be used. Bracket wall lamps, properly shaded, are also pleasing and desirable, in some cases, to supplement the ceiling unit, particularly in a large room.

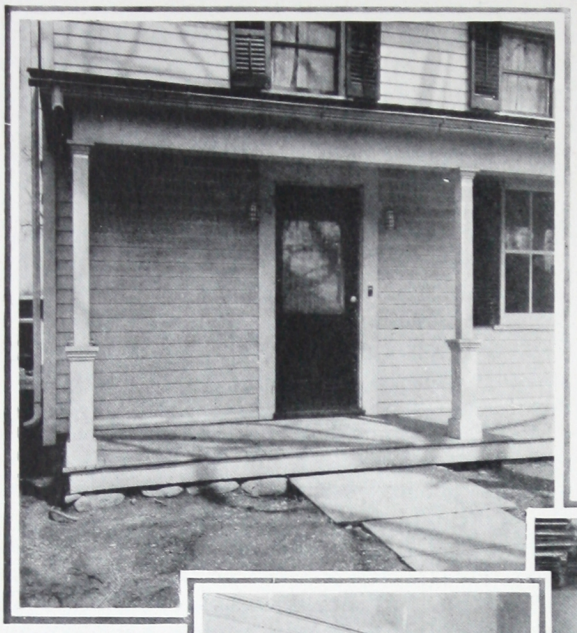
A lighting unit, or "fixture," in the center of the living room, or sitting room, will supply general illumination. It should, however, be supplemented by one or more table or floor lamps for reading, sewing, playing the piano, operating the radio set, etc. In fact, the ceiling unit may be omitted, if desired, and the room lighted by table or floor lamps only. Outlets may be provided in the ceiling and covered with an inconspicuous metal plate finished similarly to the other lighting equipment. Ceiling units may then be easily installed later, if desired. A ceiling fixture for this room should be equipped with a 100-watt or 150-watt MAZDA lamp, or if it is a shower or candle fixture, 40-watt lamps may be used in each socket; a portable lamp with a 50-watt or 60-watt inside-frosted MAZDA lamp in each socket unless it has but one socket, in which case a 100-watt lamp should be used. Wall brackets can be used in this room, if desired. If they are employed, they should be heavily shaded. If an attempt is made to obtain illumination from them, the tendency is sometimes to produce a distressing glare because of the comparatively low height at which they are installed. Some lighting authorities regard them as desirable mainly for decoration, in which case they should be equipped with low-wattage lamps (tinted, if desired) and shaded by dense shades of glass, parchment, or silk. Glass shades are now available which rest directly on the lamp bulb and do not require a separate device to hold them. In connection with wall brackets it is well to remember that furniture is moved about the room, from time to time, whereas the wall lamps cannot be moved. If these types of fixture are used, therefore, this fact should be kept in mind when choosing the locations for them.

A ceiling lighting fixture will provide excellent illumination for a bedroom, and for such a room of ordinary size a 60-watt or 100-watt inside-frosted MAZDA lamp in a glass shade or an inverted bowl reflector is a good equipment. A bracket light on each side of the mirror is also desirable.

Wall bracket lamps are also desirable in the bathroom. They should be placed at the sides of the mirror above the wash bowl, five and one-half feet above the floor, and shaded with glass or parchment shades.

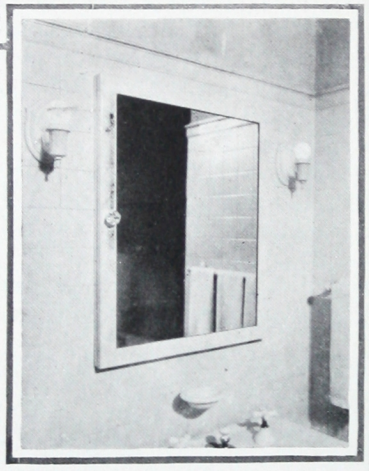
Ceiling units for the halls may be had in types made for the purpose. They should be so arranged that the stairway will be illuminated, and this can sometimes be accomplished by suspending the upper hall unit over the stairs. Three-way switches (which are explained in the

Floor or table lamps in the living room supplement the general illumination provided by a ceiling unit and are convenient for reading or sewing

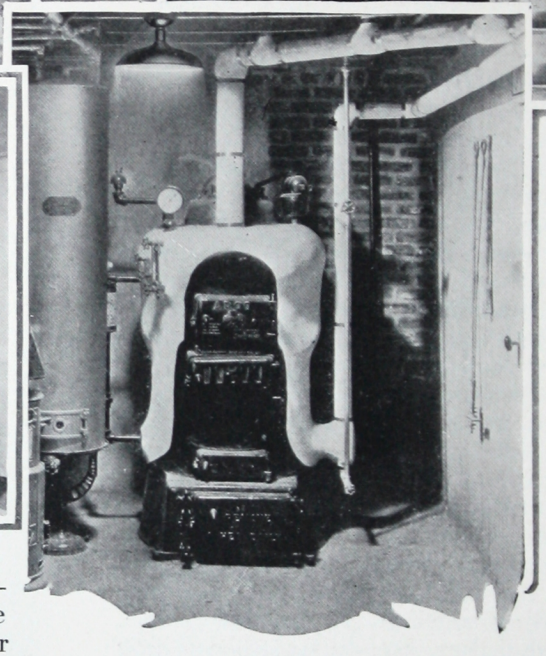


Lamps on the porch light the porch and the path

Adequate illumination of stairways is of primary importance.



In the bathroom, the lights should be installed at the sides of the mirror.



Plan the lighting of the cellar from the viewpoint of convenience. Note the shallow dome reflector.

section of this book dealing with the G-E Wiring System) will be found of exceptional value in connection with the hall lights. If either hall needs more than one light, a table lamp will often be found desirable for the second one.

The pantry and the cellar should, of course, be lighted. Neither presents a difficult problem. One of the principal things to be sought in lighting the pantry is the illumination of the shelves to the maximum extent possible. At the same time, glare from the lighting must be avoided. A little study will indicate where the cellar lamps should be placed. One should be installed where the cellar stairs will be lighted. RLM reflectors, which are of a broad, shallow type and made of metal, are especially adapted for use with cellar lights.

Porch lights should be so placed that they will illuminate the path and the steps as well as the porch itself. Especial attention should be given to the rear porch, as it is used more than any of the others in a large number of farmhouses.

It will be noted that inside-frosted MAZDA lamps are suggested in the foregoing. These are the latest development of the incandescent lamp, and excel in several respects. They are cheaper and more efficient than the type of frosted lamps formerly used. They protect the eyes by giving the right kind of diffused light. They are frosted inside and do not collect dust. They are constructed more sturdily and attractively than the old lamps, and are made in sizes that meet every requirement.

In choosing lighting fixtures, or units, efficiency should be the first consideration. After that, strive to avoid monotony. Lighting fixtures should not be of a uniform type any more than the furniture.

The Wiring System

The wiring of a building renders a service in conveying electric current to the points where it is to be used for light or power, equivalent to that which a system of piping provides in distributing water.

The G-E Wiring System is a system of housewiring embodying adequate outlets properly placed, conveniently controlled, and using G-E materials throughout. The elements consist of the following: (a) a safety entrance switch; (b) a safety distribution panel; (c) bell-ringing transformer; (d) code wire; (e) metal-covered conductors; (f) metal-encased switches, convenience outlets, and light outlets; (g) light control at doorways; (h) convenience outlets—a minimum of one for every fifty square feet of floor space; (i) light outlets—a minimum of one for every fifty square feet of floor space.

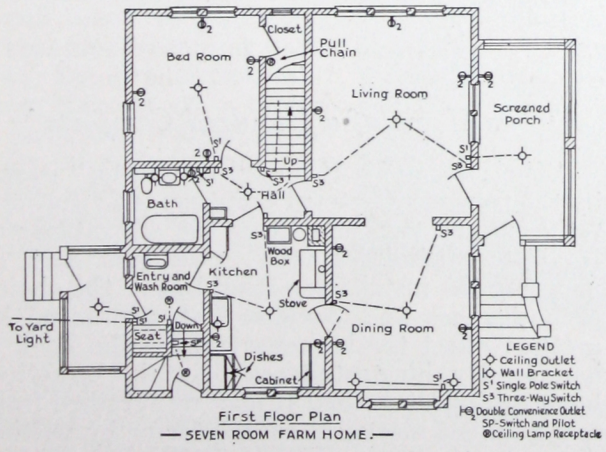
The object of the G-E Wiring System is so to raise and establish the general standard of housewiring that every householder will experience the utmost measure of comfort, convenience, and permanence from his electrical installation. The system is a unit—not a series of detached parts. The proper control of light outlets is as important as the correct plan of distribution; the high quality of the material is equally essential to durability and to safety. Product and function unite in the most complete and substantial service that electricity can bring to the enjoyment of home life and to the surroundings which give that life some of its finest values.

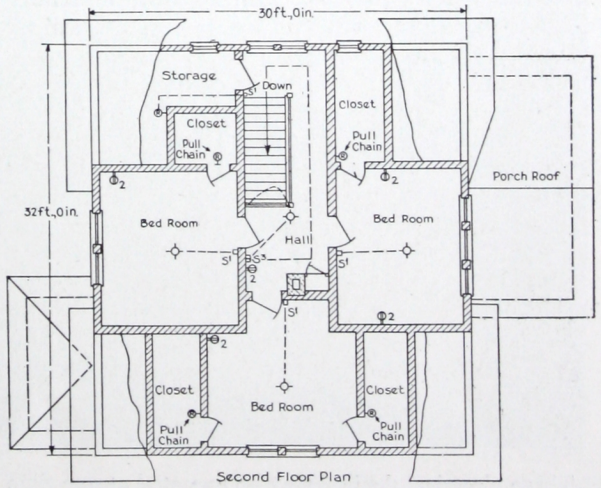
While it is easier to wire a house when it is being built than after it has been constructed, the work can be done at any time without difficulty. By the use of modern methods even the oldest houses, whether of frame, brick or stone, can be wired with little disturbance of walls or floors. Flexible armored conductor—wires covered with amply adequate insulation and the whole encased in flexible sheathing which obviates any danger of the insulation being worn or being gnawed by rats or mice—can be passed through walls and beneath floors with relatively little difficulty.

The Advantages of Switches

The convenient way to turn electric lights on or off is by means of wall switches. The wall switch does away with groping in the dark for the switch on an individual socket. There should be a wall switch in at least each of the downstairs rooms that are used often, and in both front and back halls. The proper location for a wall switch is at the side of the door by which a room is most frequently entered.

The switch most commonly used in housewiring controls the lamp in one lighting fixture. The light can be turned on or off by this one switch only. In some cases, however, it is desirable to be able to turn on or off the light from *two* places. For example, it is sometimes very convenient to be able to turn the kitchen light on or off from the kitchen itself, and also from the back porch. Thus the kitchen can be lighted before one enters the room, and the light turned off from the kitchen switch as one goes to the front of the house. These switches are known as three-way switches—one switch being installed at each of the two places where it is desired to control the lights. By their use, the light in an upper hall can be turned on or off from either the upper hall itself, or from the lower hall. This makes it unnecessary to go up unlighted stairs to turn on the light or, as





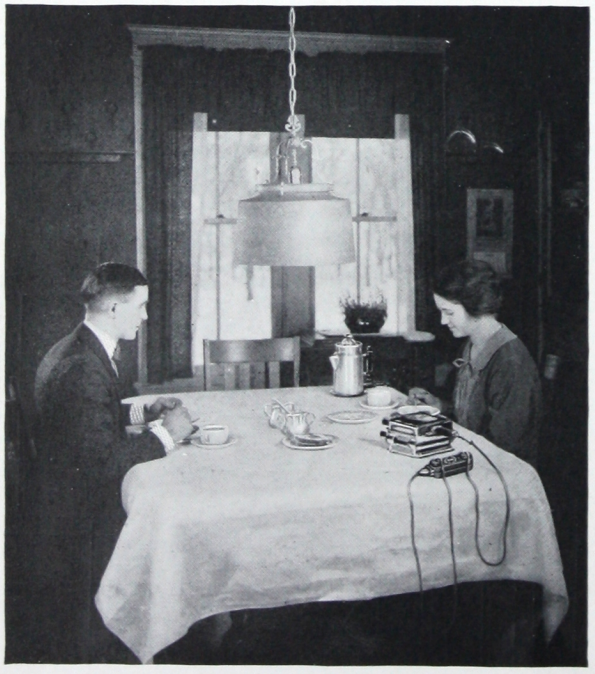
The effectiveness of electrical service depends on the completeness of the wiring system

A convenience outlet is all that the name implies

would be necessary if an ordinary switch were used, to go downstairs to turn it off. Lamps in the barn, the chicken house, the garage or other outbuildings can be turned on or off from either the house or the building itself. The farmer can turn on a light in front of the barn as he leaves the barn, and have a lighted pathway to the house, turning off the light after he reaches the porch; or, the arrangement can be reversed.

Convenience Outlets

In planning housewiring, future needs should be considered. Besides lights, several appliances, such as a washing machine and iron, will probably be wanted at first. Later an additional floor lamp or table lamp, or a toaster and vacuum cleaner may be desired. Unless provision is made when the wiring is first put in, it will be necessary to connect such appliances to lamp sockets. This is undesirable, because it often means the removal of a lamp, and it leaves the appliance cord hanging in the way. Convenience outlets are devices which are set in the baseboard, or sometimes in the wall, to which appliances can be connected.



Three electrical devices may be operated at one time by the use of the Triple Tap, shown on the corner of the table

A modern switchplate is ornamental as well as useful

The Triple Tap

It is often discovered after a house is wired that there are not sufficient outlets to accommodate appliances acquired after the original wiring installation was planned. A simple little device known as a Triple Tap is made for use where such new outlets are wanted. It consists of three convenience outlets on a lead (or cord) which can be connected to a single convenience outlet.

Bell Ringer

The bell ringer included in the G-E Wiring System is a very useful little electrical device by which a door bell can be connected directly to the lighting circuit where alternating current is used. Batteries are unnecessary when it is installed, and the bell is always ready for service. It can be used in connection with bell signal systems connecting the house and other buildings on the farm. Complete signal and fire alarm systems for farm use are now on the market and have demonstrated their value.

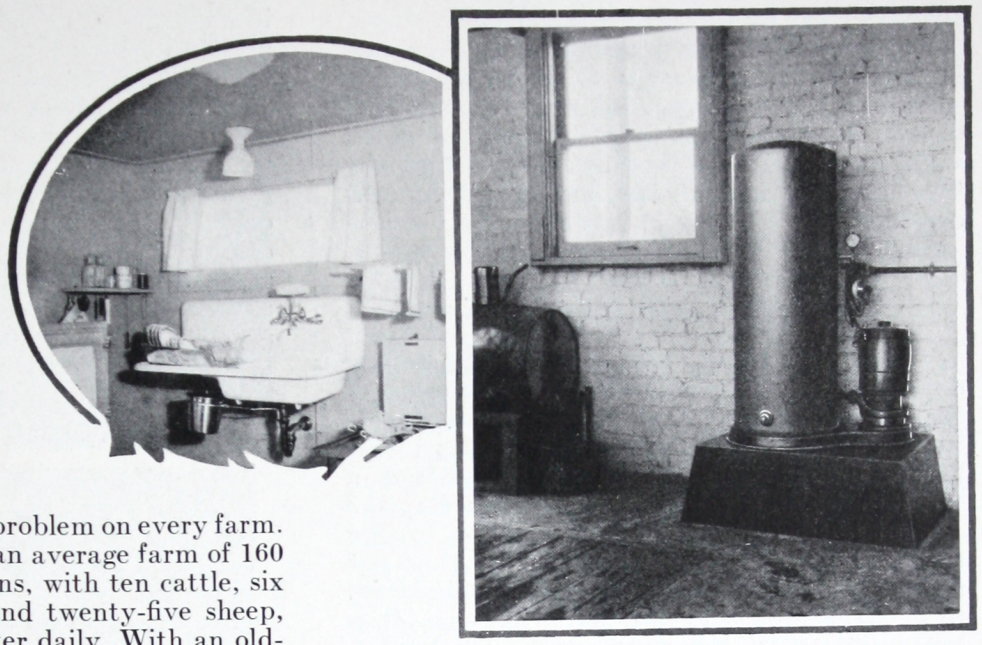
"The Home of a Hundred Comforts"

"The Home of a Hundred Comforts," issued by the General Electric Company, is an authoritative publication presenting the advantages of complete wiring. It is a guide not only in planning the installation itself but in the choice of appliances and devices that will give the greatest effect to the housewiring. The book is handsomely illustrated and contains practical home-wiring diagrams. It may be obtained from any qualified electrical contractor or by writing direct to the General Electric Company, Merchandise Department, Bridgeport, Conn.

Electricity Does the Housework

Electricity Carries the Water

A water system is of particular benefit to the farm, as it does away with one of the greatest burdens of the farm woman and permits her to do the work of the home more easily and quickly. An electrically operated water system is of economic value to the whole farm and a source of genuine comfort in the home. It can also be made the means of furnishing protection from the danger of fire—a vital problem on every farm.



A pressure tank, operated by a motor, will provide a running water system for the house

Statistics show that on an average farm of 160 acres a family of six persons, with ten cattle, six horses, twenty-five hogs and twenty-five sheep, will use 430 gallons of water daily. With an old-fashioned pump it takes at least an hour and a half to draw this quantity. In a year the time thus consumed amounts to approximately 500 hours. At ten cents per kilowatt-hour for electricity, 100 gallons of water can be lifted by a motor-operated pump 100 feet for one cent, which means that at the very most a few cents a day will provide a constant supply of fresh water. Compare this cost with that of pumping the water by hand. These figures will not apply in every case, but they serve as a basis of comparison and will assist in computing the cost of obtaining water by the old method and by the use of a motor. Automatic attachments for starting and stopping the motor are available. Current is used only when the motor is operating.

The Electric Washing Machine

Where the woman of the house is compelled to carry the water and do the washing with old-fashioned tubs and a scrubbing board, washing is one of the hardest jobs on the farm. It is practically the work of a day and in most homes one day a week is set aside as washday.

An electric washing machine takes the drudgery out of washday

An electric washing machine reduces the old-fashioned washday to a period of one or two hours. It saves time, strength, and wear and tear on the articles washed. Next to the electric water supply system it is the electrically driven washing machine that is of most benefit to the housewife.

Washing clothes in one of these machines requires no special knowledge. Given plenty of hot water and soap, the machine does all the work.

Practically all types of electric washing machines

now have power wringers or else are so designed that they remove the water from the clothes by the rapid whirling of the metal tub, driving the water out by centrifugal force.

Any good electric washing machine will operate for from two to five cents an hour, depending upon the cost of current. Estimating a total use of two hours a week, the cost of doing the washing electrically is much lower than by the hand method if the saving in time is considered.

Taking the Heat Out of Ironing

To those who have in the past dreaded ironing day, especially in the summer time, because of the tiresome job of heating old-fashioned flatirons on a stove, electricity brings another time-saving boon. The electric iron heats in a few minutes and continues hot until after the current is turned off. It takes less time to iron the weekly batch of clothes because it is not necessary to move away from the ironing board to exchange the cold iron for a hot one. It is not necessary to stay in an overheated kitchen on a summer day when the electric iron is used, as the ironing can be done wherever there is a convenience outlet or an electric light socket.

Electric irons are made in weights of from three pounds upward. One of six pounds is considered standard and will be found to be the right weight for most work.

No fire to stoke, no trips from ironing board to stove, where an electric iron is used

The electric ironing machine carries the advantages of the electric flatiron still farther. The articles to be ironed are fed into the machine in somewhat the same fashion that wet garments are fed into a wringer. They pass over an electrically operated and electrically heated roller which irons them quickly and smoothly.

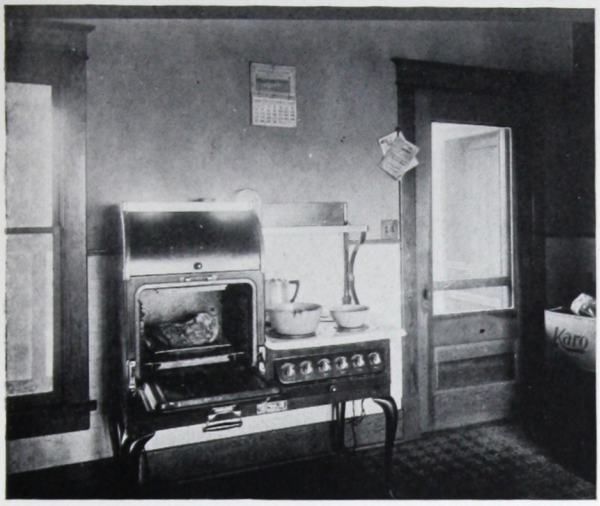
Experiments have shown that they save from two to three hours of time in doing an ordinary farm ironing, requiring, in fact, only about one-third as much time as even with an electric iron. The cost of operation is reasonable. They will iron not only "flat pieces," such as sheets and tablecloths, but shirts and blouses as well.

The ironer is among the greatest labor and time savers available for use in the home.

Another task which electricity can be made to do—washing the dishes

Washing the Dishes by Electricity

The electric dishwasher is another device which relieves the housewife of a tiresome task. It is of especial service where the family is large and there are many dishes to be washed. There are various types, some as easily moved about as a washing machine, others designed to be attached permanently to the sink or plumbing.



The electric range—safe, convenient, efficient

The Electric Range

Electric ranges provide an ideal method of cooking, and thousands of them are in use on farms. The increasing cost of coal, coke, and wood is a strong argument for their use. Some farmers have found that by selling their wood and using an electric range instead of burning the wood in the cook stove, they have saved an appreciable sum.

Convenience is another reason why the electric range is desirable. The heat is turned on or off at a mere turn of a switch. There is no necessity of constantly replenishing the fire with coal or bringing in fuel from outdoors or down cellar, no tiresome and sometimes difficult and dangerous task of kindling the fire, no ashes to be removed. In summer, the kitchen is always cooler when the cooking is electrical.

Some electric ranges are equipped with a device that keeps the heat of the oven at any temperature desired, and another device that turns the heat on and off automatically at any time the housewife wishes.

Neither the first cost, nor the cost of operation, of the electric range is excessive. Statistics show that an ordinary farm family of six members will use from 100 to 125 kw-hrs. per month for cooking.

Electric fireless-type cookers are also well worth the attention of the farm housewife.

Electric Refrigeration

Refrigeration of some form is almost indispensable in the farm home. Electric refrigeration eliminates both the labor and uncertainty of other methods.

The food reports of the U. S. Department of Agriculture show that at temperatures of 50 deg. F. or more, food quickly becomes unwholesome, while at temperatures varying from 50 deg. F. down to 32 deg. decay is greatly reduced. Electric refrigeration is the surest and most convenient method of maintaining proper temperatures and dry atmosphere.

In the electric refrigerator, an electric motor-driven compressor is used to compress a vapor to the point at which it will condense into a liquid form. This liquid then passes through a valve to a lower-pressure container, where it evaporates and thus produces the refrigeration. The evaporator is connected to the suction of the electric motor-driven compressor, which removes and recompresses the vapor as fast as the liquid evaporates.

When the contents of the electric refrigerator have been cooled to the proper temperature the automatic electric control stops the motor. In consequence the electric motor operates only sbout one-third to one-half the time, but automatically keeps the inside temperature within a narrow range of variation around 40 degrees.

The cost of electric refrigeration is not excessive and against the purchase price may be weighed the expense of building or maintaining an ice house; while against the cost of operation may be weighed the expense of filling and of

Refrigeration is one of the most important services electricity can be made to render in the home

emptying the private ice house or of hauling ice from a dealer's establishment.

Convenience, safe food—and milk—preservation, and automatic operation place electric refrigerators among the most important contributions of electricity to the farm home. Of equal importance is the assistance which electric refrigeration renders the modern dairy, which constitutes a separate phase and is considered elsewhere in this book.

General Electric has perfected a hermetically sealed unit, in which are enclosed the motor, compressor, lubricant, and refrigerant. It is placed on top of the refrigerator cabinet. This design and location of the refrigerating unit have the advantage of simplicity, natural cooling, and elimination of joints, connections, and exposed moving parts.

What the Electric Vacuum Cleaner Does

Electric service does away with the semi-annual week of housecleaning when the rugs are taken out and beaten and the house turned topsy-turvy. It also makes unnecessary the usual week-end cleaning day when carpets are swept and dust is thrown through the rooms and over the furniture.

The electric vacuum cleaner operates as easily as a carpet sweeper. Instead of scattering the dirt and filling the air with dust, as a broom is likely to do, it *draws up* the sand and grit and other dirt from between the tiny fibers of the floor covering and deposits it in a bag which can easily be emptied. It is the sanitary way to sweep.

The sanitary and easy way to clean

It is used for other purposes than cleaning the floors. Attachments are to be had for use in connection with it for cleaning upholstered furniture, blankets, and mattresses, closet shelves, curtains and over-drapes, heavy cloth table covers, fur coats and other heavy clothing, the interior of pianos, walls, mouldings and picture frames, silk lamp shades, the upholstery and floor rugs of automobiles and, in fact, anything which has hard-to-get-at nooks and crevices that harbor dust or dirt.

The cost of operation is very small; the saving in labor and the gain in sanitation and cleanliness are very great.

Another convenience—the electric sewing machine

The Sewing Machine with a Motor

Electricity brings another convenience to the farmer's wife who makes her own or her children's clothes—the electrically operated sewing machine. It can be started or stopped instantly, and is more simple to operate than one run by a

treadle. Sewing machine manufacturers now include among the many styles they manufacture those that have an electric motor installed as part of the machine. It costs very little to run one of these sewing machines, and the tiresome labor it saves more than offsets the price.

Electric Fans

Electric fans are a decided comfort in keeping a kitchen cool when cooking is being done, and when the ironing is under way; and in every room of the house during hot weather. They are easily carried from room to room and are very inexpensive to operate. In fact, a 6-inch fan may be operated five hours for one cent, based on a rate of ten cents per kilowatt-hour for current.

A Kitchen Motor

A small electric motor in the farm kitchen can be made to operate several appliances, such as an ice cream freezer, meat grinder, some types of bread mixers and egg and cake beaters. Several other household appliances can be adapted to motor operation.

Toaster and Percolator

Among the popular electric table appliances are the toaster and the percolator. They are comparatively inexpensive in first cost and in current consumption.

Toasters are made that will toast two or more slices of bread at a time. Percolators are available in several sizes with capacities for making from five to nine cups of coffee at one heating. Table appliances such as these are particularly useful where a meal is wanted quickly and without the bother of using the wood or oil stove. Toasters in use in a group of farm homes where accurate records were kept, recently, were shown to be using only from one to two kilowatt-hours of current per month.

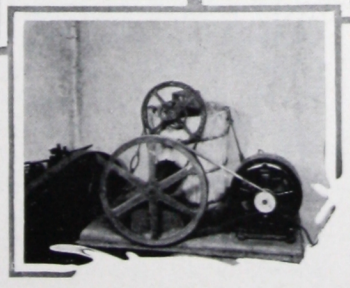
Electric Heaters

The electric heater is portable and is as easily carried from room to room as an electric fan. Connected to a convenience outlet or lamp socket, it gives a strong, concentrated heat. Even in houses equipped with furnaces, it is decidedly convenient in spring or autumn, before the furnace fire is started, or at any time when additional heat is needed. It is especially convenient in the bathroom and the sick room.

Miscellaneous Devices

The range of electrical household devices is large and increasing. It includes such things as the electric heating pad, a decidedly practical device for supplanting the hot-water bag; the electric curling iron; the electric comb; immersion heaters for heating small quantities of liquid, such as milk for the baby, water for shaving, soup, etc.; small transformers for operating Christmas tree lights; electric vibrators; violet ray outfits, and many others.

Above—An electric toaster



Center—An electric heater
Right—Electric fan
Left—Small motor attached to an ice cream freezer

Radio Does Away With Farm Isolation

The Lewisohn Stadium, New York, from which concerts are frequently broadcast

Radio audiences are kept in touch with World's Series baseball games—play by play

"Stage effects" in producing the play "Danger" at WGY

The G-E radio developmental station near Schenectady

Farm isolation is a thing of the past. It may be aptly said today that the farmer is as near to town as he is to his radio set.

Talented musicians, actors, and entertainers take part in radio programs and the farmer, figuratively speaking, occupies a front row seat. Prominent educators broadcast instructive talks and the farmer obtains the full benefit of their counsel. Crop, weather, and market reports are announced by radio in his home and he receives authoritative information that is of economic advantage to him. Broadcasting stations are being used to warn him of the spread of stock disease epidemics and insect plagues, so that he can take the necessary precautions to protect his stock or crops. This knowledge, broadcast at times when the farmer can use it most advantageously, is invaluable and could not be given him so quickly in any other way.

He listens to the sermons of nationally renowned clergymen. Statesmen address him on national affairs. At baseball and other sport contests he occupies the grandstand and in some cases follows the progress of the games, play by play.

These are a few of the benefits that are brought to the farm fireside by radio. Heavy rains or deep snow cannot keep the music in the air from the farmhouse. The curtain of isolation, obscuring the activities of the world from hundreds of thousands of out-of-the-way farms, has been lifted by radio.

Some stations broadcast extension courses under the direction of state colleges to explain scientific methods of farming that help to increase crop production. As a result, radio has become far more than a means of entertainment for the farmer. It is a thing of utility.

Three large broadcasting stations are maintained by the General Electric Company. WGY is located at Schenectady, New York, and its voice is heard, after the day's work, on the farms in the states east of the Mississippi River. KGO, the Sunset Station, is at Oakland, California, and serves the people of the West. KOA, the youngest of the three, located at Denver, Colorado, broadcasts its programs over the broad prairies of the Middle West. Station WGY gives a farm program once a week.

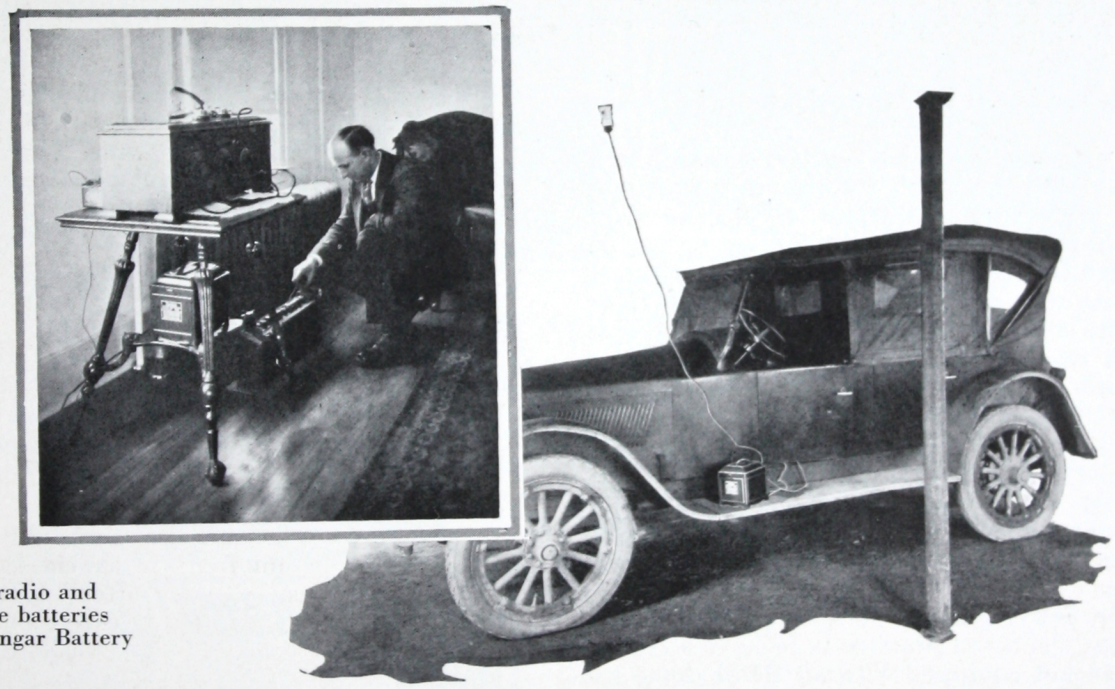
Radio is a child of electricity, but its programs are accessible to every farmer whether or not he is served with electric current. It is the helpful and entertaining contribution of an industry to the life of the American farmer.

The Tungar Battery Charger

The farmer who owns an automobile or a radio set using storage batteries can well appreciate the worth of the Tungar Battery Charger, which charges a storage battery as well and almost as quickly as can be done by the battery charging station or garage in town. The Tungar Battery Charger is simple to operate, it being merely necessary to connect one lead to the alternating-current circuit, and two clips at the end of a second lead to the terminals of the storage battery. It charges the battery during the night without being attended. The cost of operation is small.

A Tungar trickle charger, made particularly for radio cabinet or console installation, has also been developed by General Electric. Its purpose is to provide a continuous flow of current at a very low rate. When attached to the alternating-current lighting system, it permits just the same amount of current to enter the battery that the radio set draws from the battery while the set is in operation, thus keeping the amount of electricity in the battery constantly the same. This device can be used 24 hours a day, as it does not disturb radio reception except in some unusual cases. If it is preferred to disconnect it while the radio set is in operation, this can be done by merely pulling out the plug which connects it with the lighting system.

Some radio sets are so designed that current for operating them can be taken from a lighting circuit, thus doing away entirely with batteries.



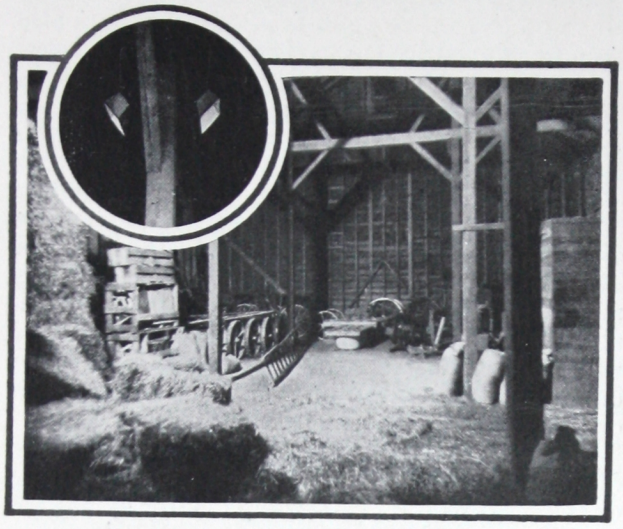
Charging radio and automobile batteries with a Tungar Battery Charger

Lighting the Farm Buildings

Proper lighting not only of barns and outbuildings but of driveways, paths between the various buildings, and the barnyard is as essential as in the farm home. The oil lantern is unsatisfactory, unhandy, and unsafe. Electric light is ideal for the purpose.

Every barn and outbuilding, like every house, presents individual problems of lighting. The following suggestions will be found applicable in a general way, however.

In the horse barn or cow stable, lights are usually located in the feeding or cleaning alleys between the stalls. They should either be placed one behind each stall or spaced not more than twelve feet apart and equipped with 100-watt inside-frosted MAZDA lamps. Enameled steel dome reflectors are used extensively, as they concentrate the light at the point where it is most needed. The full benefit of each lamp is obtained in this way and very little light is absorbed by the ceilings or walls. Where there are ten or more stalls it is economical to have the lamps divided into two or more circuits so that it is necessary only to



Electric lights in the mow and on the barn floor promote safety as well as convenience. Note the angle reflectors

light the section of the barn where work is being done.

Every farmer who has groped around in a dark hay mow, or carried a lantern up to light it, will appreciate the value of electric light when throwing down hay for horses or cattle. Inside-frosted MAZDA lamps of the 100-watt size, with enameled steel dome reflectors, or in angles reflectors on center posts, will give the best results in most lofts.

The silo and granary should be lighted with a 100-watt MAZDA lamp in an RLM dome reflector centered in the roof. This combination gives satisfactory illumination in the silo even when it is only a quarter or half filled. A 25-watt MAZDA lamp should be located near the chute or entrance to the silo for easy handling of the ensilage.

In the dairy, garage, work shop, and similar buildings, the usual practice is to have a center ceiling socket equipped with an RLM dome reflector and a 100-watt inside-frosted MAZDA lamp. Lights so installed should be controlled by a switch at the door. In cases where the building is not used often, and then only for work requiring a small amount of light, 25-watt MAZDA lamps are suggested. Large rooms may require two or more ceiling lights, and in the work shop or garage a small light over the work bench is convenient. For every such lamp an enameled steel reflector should be provided in order to increase the amount of light on the work and to reduce glare.

The arrangement of the lighting of outbuildings in general depends upon their size and the extent to which they are used for night work. Sheds housing beef cattle, sheep, or hogs do not, as a rule, require much illumination, and 25-watt MAZDA lamps in small reflectors, placed ten to twenty feet apart, will be sufficient.

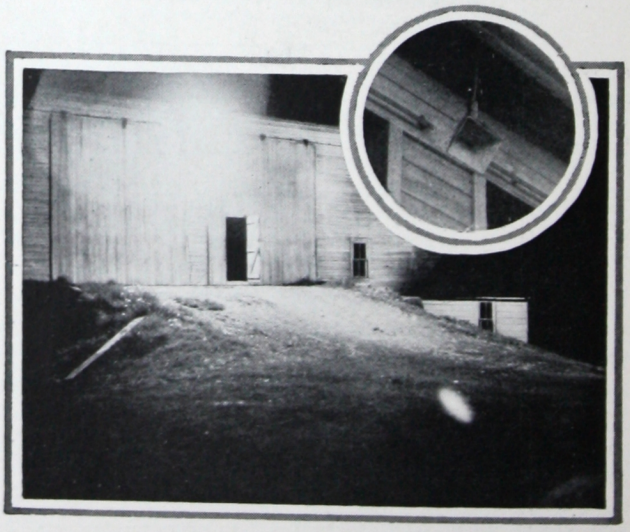
In wiring farm buildings, conduit or armored cable should be employed. While there is no likelihood of fire with insulated electric wires, moisture or ammonia fumes may rot the insulation, rubbing against walls may wear it, or rats or mice may gnaw it, causing "live" wires —that is, wires through which electric current is passing—to be exposed. Where the wires are run through conduit or steel sheathing, the insulation will not wear off or leave "live" wires exposed.

To avoid breakage of lamps in sheds, at the silo chute, and similar places, wire guards around the lamp can be used. In barns or other buildings where stock is allowed to run loose, switches should be placed at least six feet from the floor so that the stock cannot strike against them. It is best to place them out of reach of the cattle. It is advisable in barns, and especially in dairy buildings, to install porcelain or moisture-proof switches and wiring devices. They last longer and are generally far more satisfactory than metal devices in outside installations or where there is much moisture.

Lights in the stock barns and at watering troughs in yards increase the length of the day, and hence the feeding time. The result is the more rapid fattening of cattle.

Not only are lamps essential in the farm buildings, but outside the buildings as well.

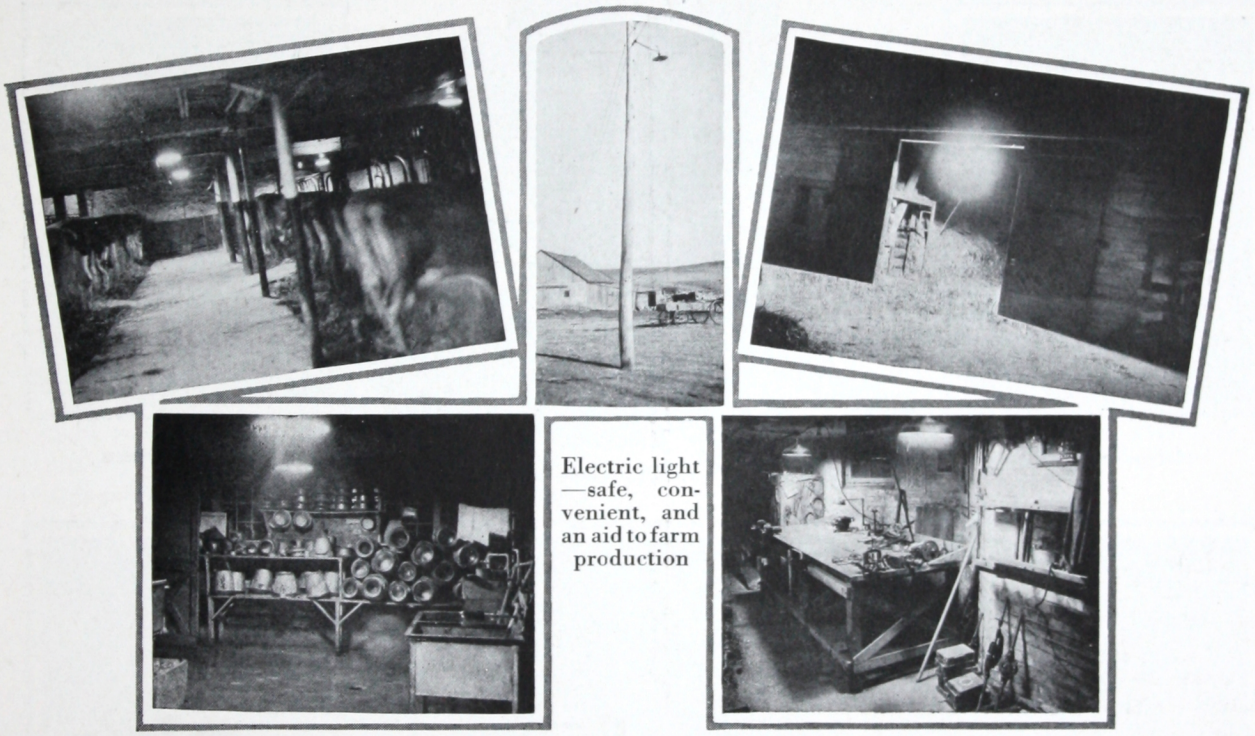
Some arrangement of lights should be provided whereby the path between the house and the barn, and paths leading to the various out-



The value of a lamp in front of the barn door is evident

buildings, are lighted. In some cases this can be done by installing a light on the front of the barn, or on the rear porch of the house, or both; in others, it may be necessary to install lamps on other buildings, or on poles. It depends, of course, on the layout of the farm buildings. A light so arranged as to illuminate the barnyard, or cattle inclosure, will be found of decided utility. On one farm, not long ago, a number of cattle which would otherwise have perished in a blizzard were saved by an electric light installed on a pole in the barnyard, which enabled the owner to see clearly enough to drive them to shelter. Lights in shallow reflectors, or angle units, installed on poles along the driveway from the highway give excellent service.

Some farmers use floodlights—portable lighting units equipped with strong reflectors—for work in the field at night during the haying or harvesting season, the current being supplied by storage batteries.



Electric light —safe, convenient, and an aid to farm production

Motors

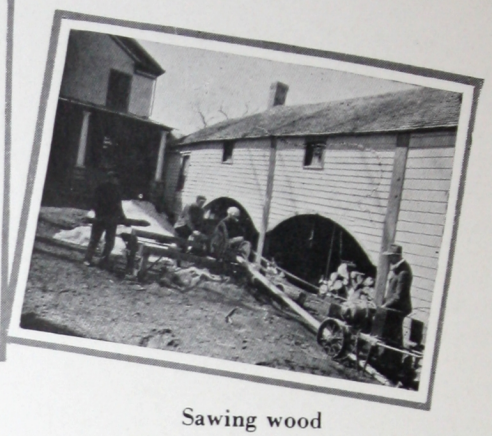
The power required for home appliances and the smaller farm machines, such as the cream separator, is supplied by fractional horse power motors; that is, motors of less than one horse power.

Motors of from one to five horse power will meet the power needs about the farmstead, except on irrigated farms, where larger motors are required for the pumps.

The electric motor is more reliable than any other form of power mechanism, for there are fewer parts to get out of order, only two bearings to oil occasionally, nothing to be affected by frost, little or no vibration, and practically no attention is required. It starts at the touch of a button or switch in any weather, requires no fuel or water, and can be controlled instantly from any distance. It can be made to work automatically, and it has a more constant speed than the gas or oil engine. It weighs from one-half to three-fourths as much as a gas engine of equal power, will carry a very much greater overload for a short period, and can be obtained in a wide range of capacities.

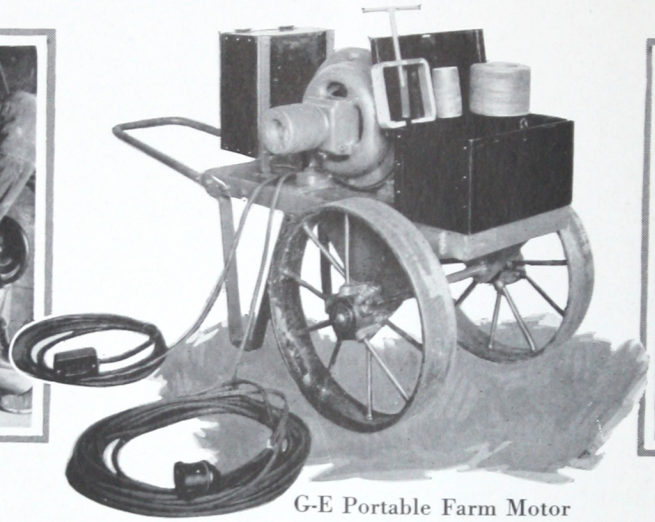
Threshing

Silo filling



Sawing wood

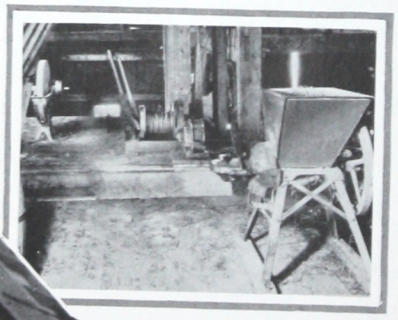
Grinding feed



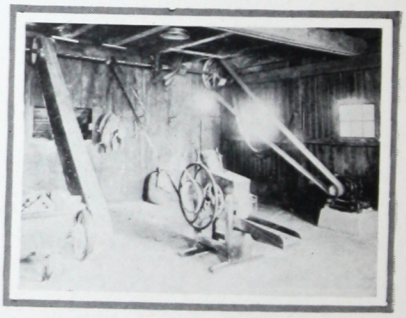
G-E Portable Farm Motor

Grading apples

Grinding oats



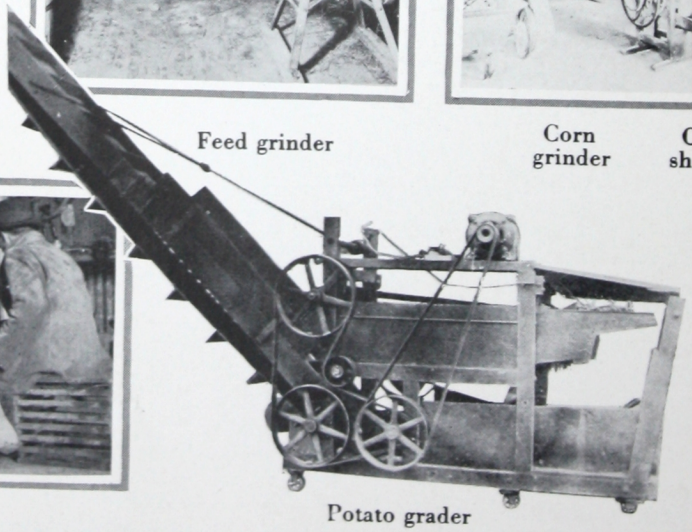
Feed grinder



Corn grinder

Corn sheller

Sharpening tools



Potato grader

Portable Farm Motor

One of the handiest of all motors for general use about the farm is the G-E Portable Farm Motor. This motor comes in a number of different sizes, and the choice should be determined by the work it is to do. Probably the best size for all-around use is the five horse power, as this will usually give enough power to saw wood, pump water for the farm and house, cut and blow ensilage, hoist hay, operate bone and green feed cutters, grindstones, cider mills, dairy machinery—in fact, enough power to perform dozens of those tasks about the farm which require so much time and labor.

The G-E Portable Farm Motor is mounted on a small hand truck, so that it can be moved easily from job to job. Three pulleys of different diameter are supplied, and with this choice of motor pulleys the correct speed for the farm machine can be obtained. A pulley puller is part of the equipment so that pulleys can be changed quickly. The motor can be started and stopped by a switch attached to the end of a long cable which can be run to the place where the operator stands.

Hay Hoists

Electrically operated hay hoists offer the farmer a real opportunity to save both time and labor at very little expense. The team does not have to be moved from the wagon to the hoisting rope and then back to the wagon. One man can unload the hay quickly and efficiently —and with less wear and tear on the rope than when horses are used—at an average rate of three minutes per load where three slings are used, or about one minute for each forkful or slingful of hay. Where a 5-horse power Portable Farm Motor is available it can readily be used to operate the hoist. A 3-horse power motor will prove satisfactory in most cases. During the winter the hoist can be used to take the hay out of the mow. It will require about 0.05 kilowatt-hour of current per ton for each ten feet of lift in the barn.

Corn Shredders

It requires considerable power to operate corn shredders, but this can often be lessened by decreasing the speed, as in the case of ensilage cutters—although not to the same extent, as dry fodder requires more power to elevate than ensilage. Shredders will help to keep the corn borer in check, and where water is available under pressure, it can be used for silage. A 5-horse power Portable Farm Motor will handle a two-roll husker and shredder easily, and even a four-roll machine if the machine is fed with judgment. In many cases, of course, the power required may be cut down by running at lower speeds. A four-roll machine has a capacity of 20 to 35 bushels per hour, and should not require over 0.2 to 0.4 kilowatt-hour of current per bushel to operate.

Threshing and Ensilage Cutting

These operations, as generally practiced, require a comparatively large motor. However, they can be done with motors of very moderate size and obviously this is very desirable from the standpoint of economy. As an illustration, one company manufactures a threshing machine with a capacity of about 35 bushels of wheat per hour which requires only a 3-horse power motor to operate.

Recent investigations in Wisconsin have brought out some remarkable facts with reference to filling silos. By slowing down an ensilage cutter having a 42-inch fan to 350 revolutions per minute it was possible to fill a silo easily with a 5-horse power motor. The cutter had a capacity at this speed (the capacity and horse power required, of course, are proportional to the speed) of 16 tons per hour. A silo from 30 to 40 feet high can thus in many cases be filled with a 5-horse power motor. An ensilage cutter is also more efficient at slower speeds. As low as ⅓ kilowatt-hour per ton was required in the cases of some of the Wisconsin farms mentioned. The average farmer should be able to fill his silo with ¾ kilowatt-hour per ton, and in many instances with less.

Feed Grinders

Feed grinders, fanning mills, and root cutters are being run by electric motors where current is available. They are economical and profitable and have advantages that justify an extensive use.

For the efficient operation of a feed grinder, automatic control is the most satisfactory, as grinding can be done at night when power is not being used for other purposes. By this arrangement the grinder is equipped with a large feeding hopper and receiving bin, and when the grain in the hopper is exhausted the machine stops automatically.

In grinding feed, pumping water, or any everyday job, it is preferable to have a small motor operating several hours a day instead of a large motor running a short time.

The power required to operate a feed grinder varies with the speed, as little as one horse power being feasible in many cases, but grinders are used requiring as high as 30 horse power or more full capacity. If the farmer has a 5-horse power Portable Farm Motor he can readily use it for driving a feed grinder. This is especially true where he does not feel justified in installing an

automatic system of grinding and mixing. Incidentally it may be said that where bins are built for automatic feed grinding they should be so arranged that the amount of the ingredients can be regulated and the mixing thus done at the same time. There should be at least four individual grain bins.

The table given below may be used as a rough guide in figuring the capacity of feed grinders:

Material	Capacity per Hr. per H.P.
Hay	50 to 100 lb.
Corn	4 to 5 bu.
Oats	2 to 3 bu.
Ear corn	1⅓ to 2 bu.

For the average grinder, hay should be dry and should be run through a feed cutter first.

There are numerous uses for the electric drill in repairing farm machinery and utensils

An estimate as to the power consumption can be made from the following table:

Material	Kw-hr. per 100 Lbs. Ground
Corn (shelled)	0.25
Corn (ear)	1.00
Oats	1.00
Rye and wheat	0.50
Hay	1.10
Bone (usually requiring a special machine)	1.10

Efficiency in the Workshop

Electricity places at the disposal of the farmer many tools for making repairs quickly which formerly were available only in the nearest town, sometimes miles away.

In the general workshop, carpenter shop, or garage where repair work is done, a motor connected to a line shaft is a good investment. It need not be of large capacity to run several tools. An emery wheel, grindstone, and perhaps a woodsaw can be used. Sometimes root cutters, feed grinders, and other machines of this class can also be connected. Some workshop devices, such as drills, have built-in motors—that is, motors which are a part of the machine.

The portable electric drill is a handy tool in the workshop. It is often used when it is desired to join the two pieces of a broken iron frame of a farm machine. Holes are bored in each part near the break, and reinforcing steel plates are bolted on tightly. Electric drills are made in several sizes.

—also for the electric soldering iron

Soldering by Electricity

The electrically heated soldering iron also finds considerable use on the farm for repairing leaky pails and cans and for doing other odd jobs. It is merely necessary to connect the lead to an electric current outlet to operate it. The heat is concentrated in the tip, which stays hot constantly while the soldering is being done.

The Electrical Dairy

Electric power is used most extensively on dairy farms for the reason that the care and feeding of stock and the proper disposition of dairy products provide a great variety of power applications.

The electric motor is a power unit that is sanitary and can be depended upon day in and day out to pump water, milk cows, separate cream, grind feed, and perform other regular duties. Electric motors save time and make it possible for one man to do the work that ordinarily requires two or more by less speedy and more laborious methods.

A clean, light barn is essential if cows are to give their best yield and milk is to be kept free from contamination. The barn should have sufficient windows to give good light and fresh air. It should have electric lights so that plenty of illumination is available for early morning and late afternoon milking and incidental chores.

The Cows Need Fresh Water

Plenty of fresh water is one of the principal requirements of dairy cows and, in producing milk, is as important as enough feed. A cow

A motor-driven pump assures a constant supply of fresh water for the cows

will not drink enough from a tank ofstale water to produce as much milk as she should. Neither will she drink enough if she has to get her supply of water from an ice-cold brook in the winter or from a stale pasture pool in the summer. The one way to make sure that the cow is getting ample water is to provide it fresh and not too cold. The electric pumping system does this at a slight cost.

Cow Clippers Aid in Cleaning

A good grade of milk cannot be produced by cows that are not properly cared for or are kept in dirty stables. To keep even a small herd of cows clean is a difficult job but one that is worth while. It can be done quickly if time is devoted to the work each day. Cow clippers are of great value in keeping the flanks, thighs, and udders of the cow free from the long hair to which particles of dirt and manure adhere. When an electric motor drives the clippers there is no handle to turn and one man can do the job.

Stock vacuum cleaners are also of value in grooming the cow and keeping her free from dust and germs. At the present time they are used principally on large dairy farms having expensive pure-bred cows and registered stock. While such cleanliness has not been practiced generally, and even today is somewhat unusual, more and more care is being given dairy cows because of the additional milk profit resulting.

The Separator Run by a Motor

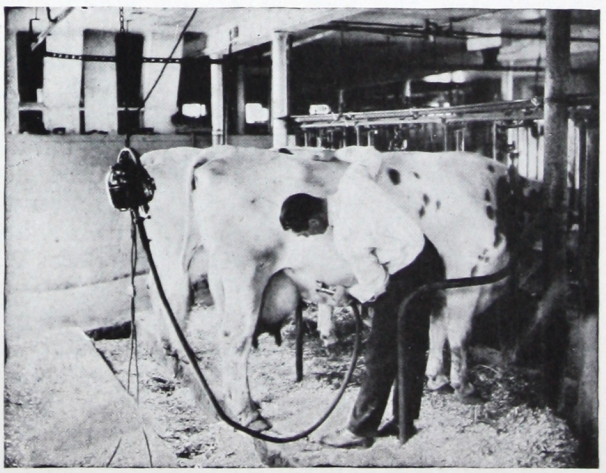
The cream separator is a common appliance on the farms in some sections of the country. Its value is better realized when we consider the results of a typical experiment conducted over a period of one year by the Indiana Agricultural Experiment Station to determine the best method of separating milk. One cow's milk was used. Water dilution lost 40.5 pounds of butter, shallow pan gravity setting lost 26.2 pounds, and deep setting lost 10.1 pounds, but the mechanical cream separator lost only 1.2 pounds.

Where current is available, the electric motor provides the best power for running the separator. It turns neither too fast nor too slowly, but at the correct speed always. Furthermore, it does the work more quickly and leaves the farmer or his wife free to do other work about the dairy while each bowlful is being separated. On one small farm it was stated that two and one-half hours a week were saved by the motor-driven separator. Electricity also does the job less expensively, as it has been found that 700 pounds of milk can be put through a separator at a cost of a little over two cents for electric current. This is based on a cost of ten cents a kilowatt-hour, but even at double that rate electricity is still far cheaper than hand power. A separator should be large enough to separate one milking in from 20 to 30 minutes.

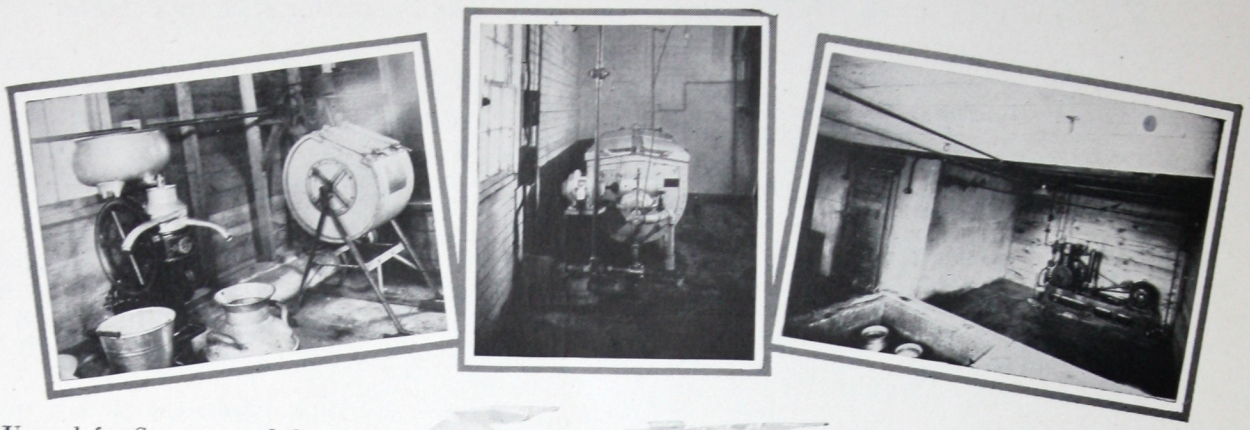
An electrically operated separator

Milking Machines are Profitable

To the farmer with five or six cows, milking twice a day is not a hard task, but merely part of the



The electric clipper is a great labor saver



Upper left—Separator and churn

Upper right—The milk-cooling apparatus referred to on the following page

Upper center—Bottle washing machine

Left—Milking machine

daily routine. If he has a large herd, it becomes a laborious, time-consuming job. More than fifty years of development work has, however, resulted in the milking machine, which does the milking more quickly and better than by hand.

The number of these machines in successful use is good proof of their merit. They have an established place on the modern farm, because they have demonstrated that they are practical, profitable machines.

The U. S. Department of Agriculture has investigated the time saved by milking machines, and reports that on farms keeping fifteen cows or less it takes 7.3 minutes to milk a cow by hand and 4.8 minutes to milk a cow with a mechanical milker. On a herd of fifteen cows the saving in time amounts of 37½ minutes at each milking, or 1¼ hours a day. On a herd of sixteen to thirty cows the saving amounted to 2.4 minutes per cow per milking; on a herd of thirty-one to fifty cows the saving was 2.75 minutes; and on herds of over fifty-one cows, the saving increased to 3.9 minutes for each cow.

The University of Illinois has also made investigations, one of which includes cost records from sixty-six Illinois farms over a period of six years. The average annual expense of keeping a cow was found to be $18.64 when the cow was machine-milked and $23.44 when hand-milked. Labor was figured at 17½ cents an hour which is, of course, low. It was found also that it takes 133.9 hours per year to milk a cow by hand as against 81.5 hours to milk with machine.

Particular attention should be given to the cleaning of the machine after each milking. If the machine is properly cleaned, the milk is better than when milked by hand, as particles of dust and dirt are kept out of the milk by the machine. Milking machine manufacturers furnish electric motor-driven vacuum pumps with machines that are to be used on farms having electric service.

Taking the Work Out of Churning

The hard work of churning, also, can be done electrically. Pumping the old type vertical churn or turning the old-fashioned barrel churn by hand has been done away with on farms having electric current. Thirty-three pounds of butter can be churned for two cents if electricity furnishes the power, estimating on the basis of ten cents a kilowatt-hour. At least an hour a week can be saved on the average farm and the labor of churning by hand is eliminated. Both barrel and dasher type churns equipped with electric motors are being used

on farms. Portable motors are being used in some instances to drive the churn, cream separator, and washing machine. Some farmers have rigged up a line shaft and are using one motor to drive several appliances.

We have discussed only the machines driven by electricity which are most commonly used by farmers the country over. On large dairy farms supplying milk direct to the cities, electrically operated refrigeration systems, bottle washers and fillers, and many other machines are in use which are not as a rule found on the average dairy farm.

Refrigeration in the Dairy

Cooling the milk is an essential process in the dairy. It may be accomplished conveniently and in a sanitary manner by the aid of electricity. An electrically operated commercial refrigerating plant may be installed in cases where the amount of milk is sufficient to justify it. For smaller dairies, apparatus specifically designed for cooling milk may be purchased, or an outfit for the purpose may be constructed.

A device of the latter kind which was installed on a dairy farm in one of the eastern states, and which is shown in an accompanying illustration, was constructed as follows:

A concrete tank, having corkboard cast into the floor and walls and built into the wood cover, was made. It was built with the edge about one foot above the floor level so that cans might be lifted in and out conveniently. An electric refrigerating unit was installed at one end of the tank, with two copper tubes passing through the wood plate at the top of the tank to a cooling coil suspended inside. The milk is strained into 40-quart milk cans immediately after milking. The cans are then set into the tank, which has sufficient water in it to come up to the necks of the cans. The refrigerating apparatus then cools the water, and consequently the milk,to the desired temperature. Shaking the cans of milk occasionally will hasten the cooling process, but this should be unnecessary where the refrigeration capacity is adequate.

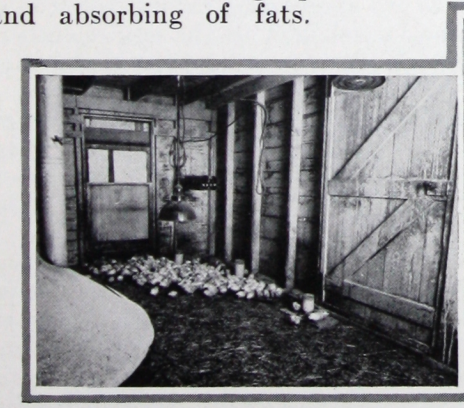
Increasing Egg Production Electrically

Electric lights in the poultry house are a source of profit to the farmer. This is proved by scores of cases in which the artificial light method has been used to stimulate egg production at those times of the year when market prices are highest.

The employment of electric lights gives the hens practically the same daylight conditions in winter as in summer. If the night is rendered shorter by means of electric light, much of the food will go to the production of eggs rather than to the building up and absorbing of fats.

The results of a large number of tests conducted by the government, agricultural colleges, and individual farmers show conclusively that it pays both the man in the poultry business on a large scale, and the owner of a small flock, to use electric lights.

Authorities assert that an average length of day of from twelve to thirteen hours gives the best results. The extra light may be added either in the morning or evening, or both. The hours added to the hens' working day should be the same in either case. If the day is made longer than



Chicks subjected to rays from the ultra-violet poultry treater

Electricity, the ideal source of heat for hatching

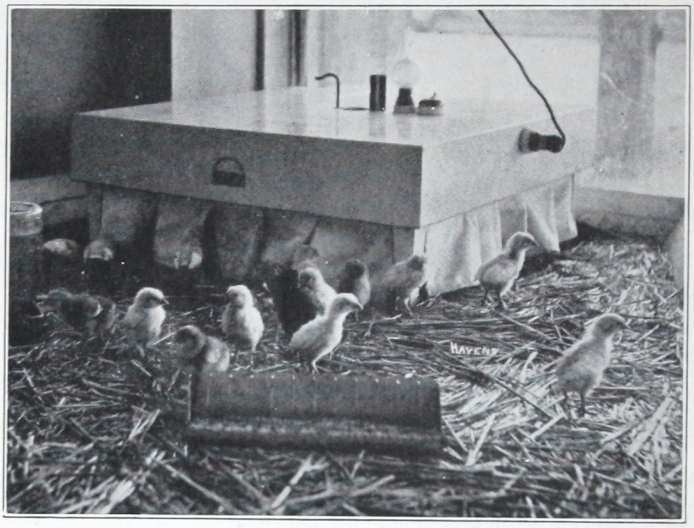
A correctly lighted poultry house

thirteen hours, the birds are forced too much. When lights are used in the evening some arrangement should be made for dimming them so that the hens will have time to get on the roost before the coop is entirely dark. There are automatic time switches on the market for turning lights on in the morning, and for dimming and turning them off in the evening.

How to Light the Poultry House

The New York State College of Agriculture, which has investigated poultry house lighting, recommends the following methods:

When automatic switches are used, the lights are switched on or off automatically without any attention, other than setting the device for the hours and time desired.



An electrically heated brooder

A 40-watt MAZDA lamp should be used with a wide, shallow reflector. The light should be hung six feet from the floor, above the head of a person passing in or out, and out of reach of the birds. The reflector should allow some direct rays to strike the perches. The lamps should be spaced 10 feet apart along a line midway between the front of the house and the front of the dropping boards.

As a general rule, to find the number of 40-watt MAZDA lamps with reflectors that will be needed for a given size of pen, divide the number of square feet of floor space by 200. The nearest whole number will be the number of lamps required. For example, a pen 15 by 15 feet will have 225 square feet, and one 40-watt MAZDA lamp will be sufficient. A poultry house 15 by 50 feet will have 750 square feet, which divided by 200 equals 3¾. In this case, four lamps with reflectors are necessary. They should be spaced 10 feet apart and the end lamps 10 feet from the ends of the pen; or, they can be spaced 12 feet apart, with a 7-foot space at each end.

Keeping the Drinking Water from Freezing

Plenty of fresh water for hens is a necessity, but during the cold northern winters it is often a difficult problem to keep the water from freezing. The Department of Agriculture has used a small electric light bulb immersed in an open pan of water for this purpose. The bulb is covered tightly with black cloth so that no light is thrown into the pen. In using this method, care must be taken not to have the lamp socket touch the water. Another practical method is to cut a hole in the bottom of the pan and solder a tin can, inside the pan, over the hole. The lamp can then be placed underneath, inside the can. The lamp will not come into contact with the water nor will the light from it be visible. Or, freezing can be prevented by the use of a small electric immersion heater, which can be obtained at electrical stores. The immersion heater can be connected to the lighting circuit and turned on with the lights in the morning. Most of those on the market at the present time are made to heat a small container of water to a high temperature. When they are used in the poultry house they should be operated for a short time only; otherwise the water will become hot.

Electric Incubators

The temperature of incubators must be closely maintained, and as electricity lends itself readily to close regulation, it is the ideal source of heat for hatching. It can be used alone, or in connection with an oil-operated incubator to supply the small supplementary amount of heat required to maintain and control the correct temperature. Electric fans are being used to an increasing extent to provide ventilation and even heat in the egg chambers.

Tests made in the case of a typical electrical incubator of 300-egg capacity showed that it used 74 kilowatt-hours for one hatching period, and 73 for another hatching period. A 600-egg incubator used 103 kilowatt-hours of current for a hatching period, and the resultant hatch was 51 per cent live chicks.

Another electric incubator of 15,000-egg capacity uses from 15 to 20 kilowatt-hours per day or from 0.021 to 0.028 kilowatt-hours per hatch per egg when the machine is operated in a room at 70 deg. F. Where a 150-egg machine is operated in a 70 deg. F. room the consumption is from 0.15 to 0.3 kilowatt-hours per egg per hatching period.

Motors Are Best for Irrigation

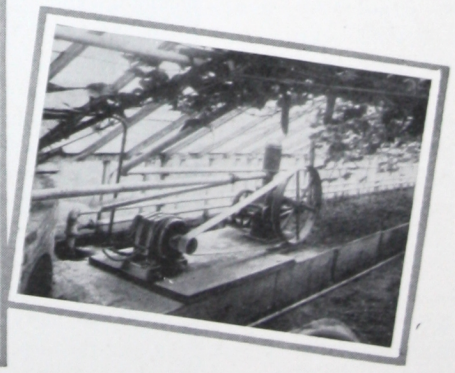
The electric motor is the heart of the modern irrigation system

Electric motors have supplanted other power apparatus for driving irrigation pumps. The Shasta Valley, in California, yields an annual harvest of $480,000 from land irrigated entirely by electrically pumped water. Along the Snake River in Oregon and Idaho there are several electrical pumping installations, some of which elevate water as high as 150 feet and irrigate as much as 15,000 acres of land. The Prickly Pear irrigation project near Helena, Montana, where General Electric installed one 600-horse power motor, is producing big harvests of peas, oats, wheat, and alfalfa.

The application of electricity to irrigation through the reliable electric motor has simplified and economized the process, especially for the farmer with a small holding. The electric motor is available for service at any time and is always dependable. It can be run for months at a time without shutting down the plant, and there are thousands of electric pumping installations which run twenty-four hours a day for six months at a time. This is possible because an occasional oiling of the motor bearings is the only attention necessary. It has the added advantage of remote control, the farmer

A motor for the water system is dependable in all kinds of weather

The motor-driven pump provides protection against fire



Greenhouse on a truck farm in New York which is provided with water by an electrically driven pump

being able to stop and start it with remote control equipment, even if he is several miles away.

It has been found that generally the farmer wants to install too large an irrigation system. The ideal plant is one that operates continuously and has a storage reservoir so that a large, expensive pump is not needed.

With a small installation of this sort and a storage reservoir capable of holding all the water pumped over a period of twelve hours, the plant can be run all night. In the morning there is a full reservoir from which the land can be watered as needed throughout the day.

The Value of Highway Lighting

Farming communities in many sections of the country are now taking an active interest in the lighting of highways. There are lighted highways in Massachusetts, Indiana, New York, Michigan, Florida, and various other states.

Approximately 50 per cent of the farmers own and drive automobiles or trucks, and many own both. Highway lighting minimizes the glare from the headlights of an approaching automobile, making it possible to see the car easily. It prevents accidents on dangerous curves by illuminating the side of the road, ditches, and other obstacles. It also adds to the comfort of night driving by relieving eye-strain, by giving plenty of light to make repairs, and by discouraging holdups.

Daytime view of road equipped with Novalux Highway Lighting Units

Highway lighting benefits the farmer who hauls his products to market, and safeguards the pedestrian. As a rule the farmer goes to the market early, and often he has to use the highway after dark. A lighted highway enables him to make the journey speedily and without the danger of collision involved in driving a team and wagon lighted only by an oil lantern. Furthermore, much of the trucking is diverted from daytime to night, relieving the usual heavy traffic during the day, especially on the main highways between towns. In some cases, this makes it possible to delay expending money for increasing road widths, a very apparent need now in many unlighted rural communities.

There is another important advantage in addition to the direct benefit of highway lighting. Highway lighting helps to bring electricity to the farms by providing the necessary poles and lines for distributing electric current. Electric light, heat, and power companies can furnish current to the farmer more readily where highway lights are in use than where the power consumed by the farmer yields the only income from the line.

A "ribbon of light"—safe and convenient

Meaning of Some Common Electrical Terms

The flow of electricity through wires may be likened in a very general way to the flow of water through pipes.

The amount of water that passes through a pipe in a given time depends not only on the quantity that enters the pipe but on the pressure under which it flows. The amount is measured in *gallons*, the pressure in *pounds*.

The quantity of electricity that flows in an electric circuit is measured in *amperes;* the pressure under which it flows is measured in *volts*. The quantity that will flow through a wire in a given time (the number of amperes multiplied by the number of volts pressure) is measured in *watts*—corresponding to the number of gallons delivered by a pipe in the case of water.

For convenience, these watts are usually reckoned by thousands, or kilowatts—*kilo* meaning thousand. Electric current is bought and sold by the *kilowatt-hour;* that is, a kilowatt of electricity supplied for an hour. It is as if water were sold by kilo-gallon-hours—water passing through a pipe at a rate of a thousand gallons per hour, with the flow continuing for an hour.

Thus, bills for current are based on kilowatt-hours just as those for sugar are based on poiunds, or those for oil on gallons.

Electric lamps are rated in *watts*. A 50-watt lamp consumes 50 watts of electricity while it is in operation. If used for an hour, it consumes 50/1000 (0.050) of a kilowatt-hour of current.

From this it is easy to figure the cost of operating a lamp. To operate a 50-watt lamp costs, when the rate for electric current is 10 cents per kilowatt-hour, 0.050 of 10 cents, or 5 mills—half a cent—an hour. Similarly, a 25-watt lamp, at the same rate for current, costs a quarter of a cent an hour to operate; or, stating it in another way, the 25-watt lamp may be operated continuously for four hours for one cent.

Electrically heated devices—flatiron, toaster, electric range, and other appliances of the kind, usually have the number of watts of current they consume stamped on them. If they do not, and the number of amperes and volts for which they are designed is given, the number of watts, or wattage, can be determined by multiplying the amperes by the volts. Having learned the number of watts they consume, the cost of operating them at whatever rate for current is charged, is easily figured.

Motor-driven machines, such as washing machines, vacuum cleaners, cream separators, and the various items of farming machinery, are rated in horse power. Motors of less than one-horse power are called fractional horse power motors.

Fuses

When placed in an electric circuit the fuse prevents too great an amount of current from passing through the wires.

A fuse is a device designed to safeguard a wiring system and the lamps and appliances attached to it against an excessive amount of current. Its essential feature is a link of metal which melts at a comparatively low degree of heat. When an excessive amount of current passes through a wire, it tends to heat the wire. The fuse as well as the wire is a part of the circuit and carries the current. If more current than the circuit is designed to transmit attempts to pass the fuse, the metal link is heated and melts, thus breaking the circuit and stopping the flow of current.

There are various types of fuses. The commonest, which is used in the wiring systems of houses and other buildings, is the plug fuse, which screws into a socket. It is rated in amperes and is made in various sizes, from three to thirty amperes. The cartridge type is used for heavier currents and is often employed on circuits to which motors larger than the fractional horse power sizes are connected. The metal element is held by clips, and in the case of some makes the burned-out link can be replaced by another. The time limit fuse is also often used in connection with motors. It will not burn out when the motor current rises above normal for a few seconds, as in starting, or because of a momentary overload, but will melt, if the overload continues, before the motor can be damaged by the excessive current.

Electrically operated devices called overload relays are used in place of fuses for the larger motors. One of their advantages is that they can be reset easily after they have opened the circuit.

Transformers

The transformer is a device for increasing or diminishing—as may be desired—electrical pressure. Electric current is transmitted over long distances at high pressure, or voltage. Generally speaking, the greater the distance, the

higher the pressure employed. This pressure is usually too great for use in the various appliances and motors that are to be operated, however; therefore, it has to be reduced, or "stepped down," to use the technical term. Again applying the analogy of a water system, it is as if water were brought to a farm at a pressure of 500 pounds per square inch. It would not be practicable to use it at such a pressure. The plumbing would have to be correspondingly strong and hence expensive, and the pressure would be undesirable for various reasons. A pressure-reducing valve would have to be introduced between the water main and the pipe leading into the house or barn. The transformer renders the same service in the electrical circuit. It acts as a pressure reducing "valve."

Alternating Current and Direct Current.—Electric current is transmitted in two forms—direct current and alternating current, usually referred to, respectively, as d-c. and a-c. In direct current the flow is steady, while in alternating current it is in something akin to waves; the flow is of the nature of a pulse-like motion. Alternating current is used where the current must be sent for any considerable distance, and with few exceptions is the form employed on electric light and power lines. Most individual farm light and power sets generate direct current. The "waves" or impulses in alternating current are called *cycles*. "Sixty cycles" means that there are sixty of these "waves" per second.

Motors are designed for operation either by alternating or by direct current, although some special smaller fractional horse power motors are so designed that they will run on either. It is essential to know which kind of current is to be used before buying a motor.

Meters

Electric meters are instruments used to measure electricity. The watt-hour meter is employed to measure the number of watts consumed. A volt-meter measures the pressure of the current in volts, an ammeter (a contraction of amperemeter) the number of amperes—or quantity—of electricity.

G-E Wiring System

General Electric manufactures all the material used in the G-E Wiring System, including: Insulated wire, BX Flexible Armored Conductor, G-E Tumbler Switches, Greenfield Flexible Steel Conduit, Convenience Outlets, Sprague-duct Rigid Steel Conduit, Lamp Sockets, Bell Ringers, and in fact everything which goes to make up a complete wiring system.

Lamps—Edison and National MAZDA *Lamps*

Lamps for homes are obtainable at electrical and other stores or from electric light and power companies in all large cities and towns. Lamps for automobiles are sold in garages and automobile supply stores in almost every city, town, and village.

Electrically Driven Appliances

General Electric has co-operated with a large number of manufacturers in developing the proper motor for each particular appliance. As a result, it is possible to select appliances equipped with G-E motors. The GE monogram, a guarantee of good service and an indication that the machine is of good quality throughout, appears on the motors of various makes of the following machines:

Clothes Washing Machines, Electric Vacuum Cleaners, Ironers, Dishwashers, Cream Separators, Milking Machines, Portable Electric Drills, Domestic Water Pumps, and Refrigerators.

Electric Devices

Other useful appliances and devices manufactured by the General Electric Company and sold through dealers and electric light and power companies include:

Electric Fans, Tungar Battery Charger, Soldering Irons, Immersion Water Heaters, Triple Tap, Bell Ringer, Vacuum Cleaner, and Refrigerator.

Motors and Control

There is a General Electric motor for every farm purpose and a General Electric switch or device to control it conveniently. In selecting the motor to serve most economically in any application, your electric light, heat, and power company will be glad to investigate individual problems and advise you.

Radio

General Electric Company has been a pioneer in the development of many kinds of radio apparatus and manufactures many radio products, which are sold only by the Radio Corporation of America through dealers in practically every town and city.

Farm Light and Power Plants

General Electric engineers have co-operated with manufacturers of farm light and power plants, both gas-engine driven and water wheel driven, in applying the most efficient and economical generator to their machines. The

G-E monogram on the generator of a plant is an assurance of reliable service.

Dependable Products

It is particularly important for the farmer, in wiring his home and buildings and in equipping his farm with electrical machines, to obtain products of unquestionable quality. Reliable wiring devices, lamps, motors, and appliances are especially necessary on the farm, as the nearest dealer or agent may be in a town severa miles away.

Average Costs of Electrical Service

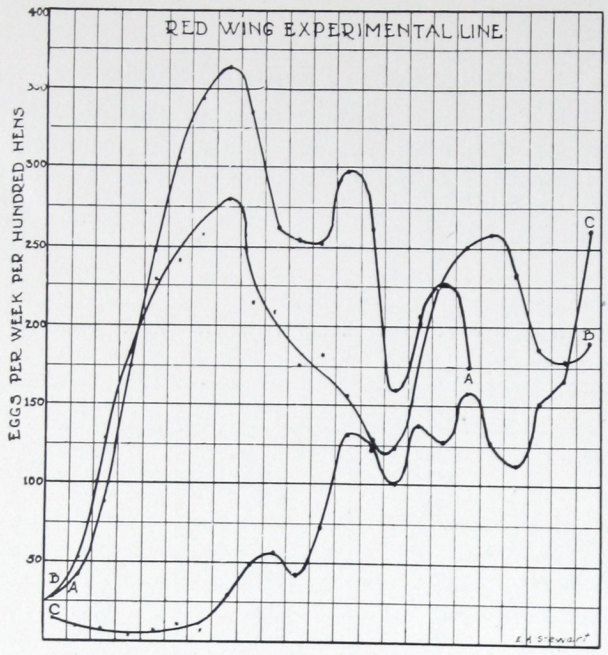
The following figures, showing the average cost of operating various household electrical appliances at different rates for current, is given by the Engineering Extension Department of Iowa State College.

Note that the rates in this table are expressed in *cents and fractions of a cent.* For example, the first figure following *Battery Charger* is 56/100 of a cent, not 56 cents.

Rate per Kw-hr.	6c.	8c.	10c.	12c.	15c.
Battery Charger	0.56c.	0.76c.	0.95c.	1.14c.	1.43.c
Cooker	4.0	5.3	6.6	7.9	9.9
Curling Iron	0.15	0.2	0.25	0.3	0.38
Disc Stove, 4 in.	2.4	3.2	4.0	4.8	6.0
Disc Stove, 6 in.	3.7	4.8	6.0	7.2	9.0
Disc Stove, 8 in.	5.6	7.6	9.5	11.4	14.3
Fan, 8 in.	0.18	0.24	0.3	0.36	0.45
Fan, 10 in.	0.2	0.28	0.35	0.42	0.52
Fan, 12 in.	0.27	0.37	0.46	0.55	0.69
Fan, 16 in.	0.5	0.7	0.86	1.0	1.3
Flatiron, 3 lb.	1.8	2.4	3.0	3.6	4.5
Flatiron, 6 lb.	3.4	4.6	5.8	6.9	8.6
Grill	3.6	4.8	6.0	7.2	9.0
Headlight Heater	3.8	5.0	6.3	7.5	9.5
Immersion Heater (small)	1.8	2.4	3.0	3.6	4.5
Immersion Heater (large)	3.0	4.0	5.0	6.0	7.5
Hot Plate or Table Stove	3.7	4.8	6.0	7.2	9.0
Percolator	2.4	3.2	4.0	4.8	6.0
Sewing Machine	0.18	0.24	0.3	0.36	0.45
Soldering Iron	0.4	0.5	0.6	0.8	1.0
Toaster	3.0	4.0	5.0	6.0	7.5
Vacuum Cleaner	0.9	1.2	1.5	1.8	2.2
Waffle Iron	4.0	5.3	6.6	7.9	9.9
Warming Pad (3 heat)	0.36	0.48	0.6	0.72	0.9
Water Pump	1.2	1.6	2.0	2.4	3.0
100 Watt Nitrogen Lamp	0.6	0.8	1.0	1.2	1.5
Washing Machine	1.2	1.6	2.0	2.4	3.0

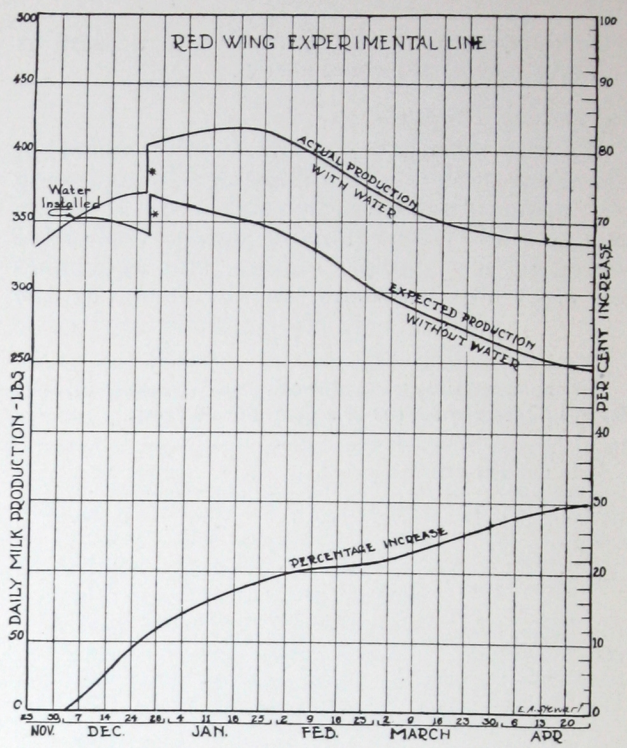
Electric Range Rate at 4c. per kw-hr.

Large Oven Top Unit	6c.	Small Oven or Broiler	4c.
Large Oven Bottom Unit	6	10-inch Burner	8
		8-inch Burner	4



EFFECT OF LIGHTING ON EGG YIELD

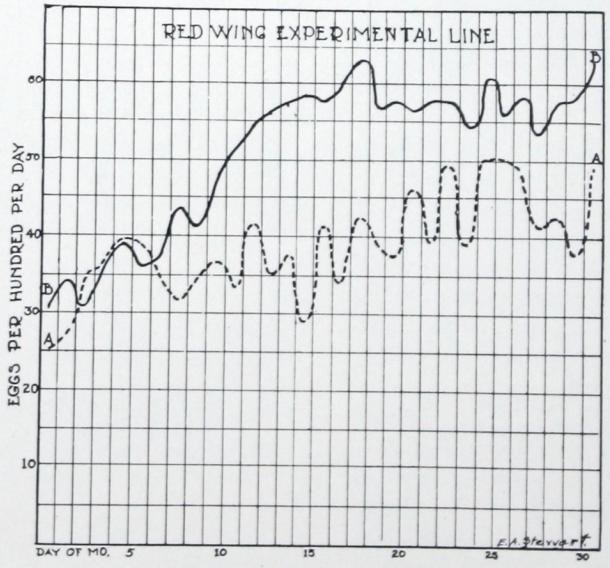
"A-A"—Hens in comfortable house. Lights used from dark to 9:00 P.M. Nov. 1, 1925 to Mar. 1, 1926
"B-B"—Hens in cold house. Lights used from dark to 9:00 P.M. Nov. 1, 1925 to Mar. 1, 1926
"C-C"—Hens in comfortable house. No lights used.



EFFECT OF DRINKING CUPS IN A BARN ON MILK PRODUCTION

**Fresh Cow Added*

Note. Expected production determined by ratio of production to period of lactation as given by Eckles.



EFFECT OF LIGHTING ON EGG PRODUCTION

"A-A"—Egg yield of check pen without lights.
"B-B"—Egg yield of flock with lights.

These charts were prepared by Prof. E. A. Stewart of the University of Minnesota. They are reproduced here by courtesy of the Committee on the Relation of Electricity to Agriculture

Contents

November, 1926 (20m)

FOR further information about wiring your home or farm, or about any of the devices mentioned in this book, or about any of the many applications of electricity, and particularly about the selection of electric motors, we suggest that you consult with the electric light and power company that supplies you with electric service, or the one nearest your farm. Many of the electric light and power companies have men who devote their entire time to matters relating to farm electrification, and who are willing and competent to advise you.